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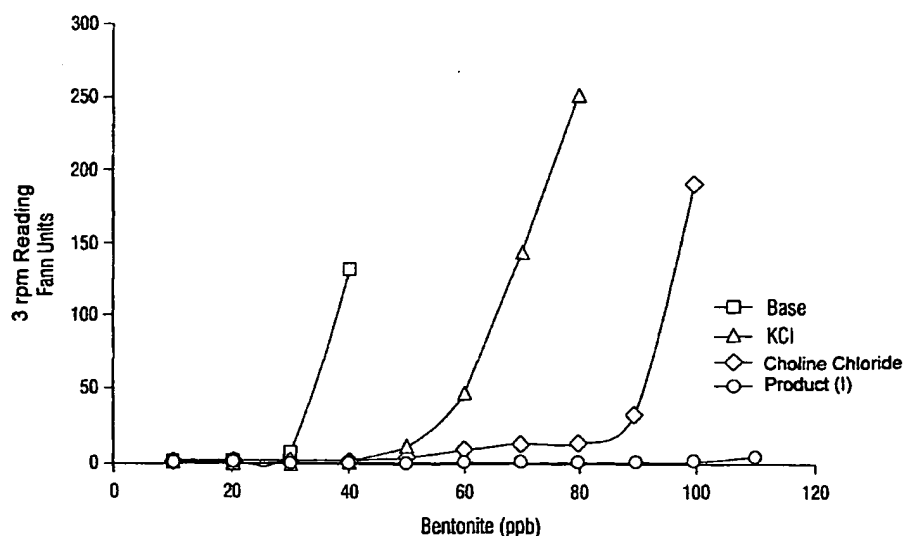
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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: SHALE HYDRATION INHIBITION AGENT AND METHOD OF USE



(57) Abstract: A water-base drilling fluid for use in drilling wells through a formation containing a shale which swells in the presence of water. The drilling fluid preferably includes: an aqueous based continuous phase, a weight material, and a shale hydration inhibition agent having the formula: $H_2N-CH(CH_3)CH_2\{-OCH_2CH(CH_3)-\}_x-NH_2$ in which x is a value less than 15. The shale hydration inhibition agent should be present in sufficient concentration to reduce the swelling of the shale. Preferably x has an average number between about 1 and about 5 and more preferably x has an average number of about 2.6. Also inclusive of the present invention is a method of reducing the swelling of shale clay encountered during the drilling of a subterranean well, the method comprising circulating in the well a water-base drilling fluid formulated in accordance with the present invention.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C09K7/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C09K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 838 514 A (MI DRILLING FLUIDS LLC) 29 April 1998 (1998-04-29)	1,4-6,8, 9,11,12, 14,15, 17,18
A	page 6, line 55 -page 8, line 19 page 9, line 10 - line 58 page 5, line 11 - line 22 ---	7
Y	EP 0 634 468 A (MI DRILLING FLUIDS CO) 18 January 1995 (1995-01-18)	1,4-6,8, 9,11,12, 14,15, 17,18
	page 5, line 37 -page 8, line 17 page 9, line 5 - line 42 --- -/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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C. (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 93 02151 A (LUBRIZOL CORP) 4 February 1993 (1993-02-04) page 9, line 19 - line 34 page 27, line 1 -page 28, line 11 ---	1-3, 8-11,14
Y	US 5 330 662 A (JAHNKE RICHARD W ET AL) 19 July 1994 (1994-07-19) column 9, line 21 - line 46 column 19, line 31 -column 22, line 7 column 28, line 3 - line 38 ---	1-3, 8-11,14
A	GB 2 328 228 A (SOFITECH NV ;DOW EUROP SA (CH)) 17 February 1999 (1999-02-17) page 5, line 24 - line 34 page 6, line 15 -page 7, line 30 -----	1,4,5,9, 11,15, 17,18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC1/US 01/02966

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0838514 A	29-04-1998	US 5424284 A	13-06-1995
		AT 173290 T	15-11-1998
		AU 675709 B	13-02-1997
		AU 6612194 A	12-01-1995
		CA 2126938 A	03-01-1995
		DE 69414481 D	17-12-1998
		DE 69414481 T	01-07-1999
		EP 0634468 A	18-01-1995
		NO 942493 A	03-01-1995
		US 5908814 A	01-06-1999
EP 0634468 A	18-01-1995	US 5424284 A	13-06-1995
		AT 173290 T	15-11-1998
		AU 675709 B	13-02-1997
		AU 6612194 A	12-01-1995
		CA 2126938 A	03-01-1995
		DE 69414481 D	17-12-1998
		DE 69414481 T	01-07-1999
		EP 0838514 A	29-04-1998
		NO 942493 A	03-01-1995
		US 5908814 A	01-06-1999
WO 9302151 A	04-02-1993	AU 647309 B	17-03-1994
		AU 2324492 A	23-02-1993
		BR 9205352 A	16-11-1993
		CA 2088480 A	19-01-1993
		CN 1068842 A	10-02-1993
		EP 0549770 A	07-07-1993
		MX 9204198 A	01-07-1993
		NO 930976 A	17-03-1993
		PH 30262 A	20-02-1997
		US 5260268 A	09-11-1993
US 5330662 A	19-07-1994	CA 2091420 A	18-09-1993
		CN 1076471 A	22-09-1993
		EP 0561607 A	22-09-1993
		FI 931163 A	18-09-1993
		NO 930950 A	20-09-1993
		US 5620946 A	15-04-1997
GB 2328228 A	17-02-1999	ZA 9301864 A	05-10-1993
		AU 8736698 A	08-03-1999
		BR 9814943 A	05-09-2000
		WO 9909109 A	25-02-1999